

## The United Kingdom's Air Drop Capability

**LT Col J.A.H. Potter**  
 Directorate of Joint Capability – JM2  
 04-F-12  
 Whitehall, London SW1A 2HB  
 UK

**Maj L. Giles**  
 47 (AD) Squadron RLC  
 FAF Lyneham, Chippenham  
 Wiltshire SN15 4PZ  
 UK

### HISTORICAL PERSPECTIVE

1. During World War I the feasibility of supply from the air (UK uses the term Air Despatch<sup>1</sup>) was investigated to overcome difficulties in re-supply by traditional land routes. It was demonstrated successfully at the siege of Kut-el-Amara (Mesopotamia) and subsequently on the Western Front. However, it was not until the development of effective transport aircraft during World War II that this method of re-supplying ground troops became significant. The responsibility for rigging, installing and despatching loads from aircraft was vested in the Royal Army Service Corps and Royal Indian Army Service Corps.

2. By 1943, during the Burma campaign of World War II, operations showed that an army need not be exclusively dependent upon its ground lines of communication for supply and, therefore did not need to hold large stocks of supplies. General Orde Wingate's Chindit campaign relied almost exclusively on aircraft dropping supplies and equipment behind enemy lines into jungle clearings.



**Figure 1: Air Despatchers operating and training during the Second World War.**

3. By the spring of 1944, the demand for aerial supply to support the Special Operations Executive (SOE) and local resistance operations in occupied countries became pressing. Concurrently, it was realised that there would be a heavy demand on this capability to support D-Day and subsequent operations. Consequently, the Air Despatch Group was formed. At its zenith the Group comprised 5000 personnel and approximately 1500 vehicles. The early operations of the Group included D-Day, the Falaise Gap and the Relief of Paris. These were a prelude to the huge and costly effort made to re-supply the 1<sup>st</sup> Airborne

<sup>1</sup> UK Joint Warfare Publication 4-01.6 (UNCLASS) defines Air Despatch as "The specialist airborne delivery method for dropping equipment and supplies from fixed and rotary wing aircraft to the Land and Maritime environments".

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Division during the Battle of Arnhem (Op MARKET GARDEN) in September 1944, when 900 personnel of the Group flew over 600 sorties.

4. In post-war years, air supply has been called upon to meet many military and civil contingencies. It played an auspicious part in the successful campaign against communist terrorists in the Malayan emergency, which started in 1948, providing the vital lifeline without which patrols could not have penetrated the jungle hideouts of the insurgents. Air Despatch has also supported operations in East Africa, Suez, Brunei, Aden, Borneo, Oman, Northern Ireland, Rhodesia, The Falklands and Northern Iraq. During Operation CORPORATE (Falkland Islands) in 1982 new techniques were developed to meet the requirement to deliver stores and equipment to ships at sea.



**Figure 2: Air Despatch soldiers operating in support of the Malayan Emergency.**

5. Participation in a number of high-profile humanitarian relief operations around the world has maintained the public profile of the Air Despatch capability. In 1973 a famine relief operation was mounted in Nepal during which some 2000 tons of grain was delivered to the starving population in the remote and inaccessible areas of the Himalayan foothills. Techniques developed in Nepal were used again, on a large scale, in Ethiopia in 1985, and in recognition of this support, 47 Air Despatch Squadron Royal Corps of Transport (now 47 Air Despatch Squadron Royal Logistic Corps) was awarded the Wilkinson Sword of Peace. Other examples include Zimbabwe in 1979-1980 and the Kurdish relief operation in 1991. In recent years elements of 47 AD Sqn have deployed in support of operations in Macedonia, Afghanistan, Iraq and in support of Special Forces as part of the war against terrorism.

6. Today, the Air Despatch Squadron, in conjunction with RAF Tactical Air Transport forces, provides the capability to support the Special Forces, Maritime, Land, Air, Logistic and Civil components within the context of Joint Operations.

## UK DEFENCE REQUIREMENT

7. The requirement for an airborne capability and, as a sub element, an Air Despatch capability has been subject to a number of reviews in recent years. The Post Cold War Options-for-Change in the early 1990s was followed by the Strategic Defence Review (SDR) in the late 1990s. This was followed by the Strategic Defence New Chapter post 9/11. SDR examined the UK's requirement for an airborne capability as part of theatre entry/rapid reaction forces. It concluded that the UK should retain an Airborne Task Force<sup>2</sup> (ABTF) capable of being force packaged around a single battalion with associated combat support

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<sup>2</sup> The ABTF comprises the Airborne Battlegroup (single battalion group) and the Tactical Air Transport to deliver the force. The UK currently has mix of Hercules C130J and K. There is no endorsed airborne and/or airdrop role for the UK's C17 fleet.

and logistics. The ABTF would be part of the Joint Rapid Reaction Force (JRRF) which comprises a mix of different types of forces drawn from the Navy, Army and Air Force. Forces assigned to the JRRF are kept at a high state of readiness to deploy.



Figure 3: Troops embarking for an ABTF operation for delivery by C130.

8. Defence Policy enshrined through SDR is promulgated through the Defence Strategic Guidance (DSG) which it is intended should be issued biennially. DSG provides the provenance and direction for much of the MOD's decision making when allocating resources. DSG makes clear that the UK should retain an ABTF and in addition the ability to deliver Special Forces by parachute. There is also the requirement for other specialist units to retain a parachute insertion capability. Such units include the brigade reconnaissance force of the Commando Brigade and the Submarine Parachute Assistance Group which is capable of providing specialist support in the event of a submarine (UK or other) requiring assistance.

9. DSG provides the direction that delivery of an ABTF, Special Forces and other specialist units is the Defence Policy driver for tactical air transport capable of delivering both personnel by parachute together with the appropriate stores and equipment. However, the wider utility of using airdrop as method of resupply to other types of forces has been recognised in the UK's recently published Joint Warfare Publication titled 'Air Despatch'. This makes clear that airdrop has a wider utility beyond just support to airborne forces; roles and tasks include support to ground and maritime forces and in support of Other Government Departments when the UK contributes to disaster relief operations.

10. Work is on-going to define the capabilities (equipment and stores) which the UK must be able to airdrop to meet Defence Policy requirements (current and planned operations) and thereby allow forces to operate in line with their approved Concept of Operations. This work will allow an audit to be conducted of the current airdrop inventory against the capability requirements to better determine what capability gaps exist and, which airdrop systems may be best utilised for the different tasks.

## IN-SERVICE CAPABILITY

11. 47 AD Sqn is able to provide an airdrop capability from both fixed and rotary wing aircraft.. The methods of despatching small, medium and large stores are articulated in the following three paragraphs.

12. Small Stores. Stores ranging from 30 to 317kg are despatched using up to 4 soldiers from the parachute side doors or the ramp end of the aircraft. Various methods have been developed in order to support and sustain patrols or deliver high value items quickly. The types of loads are given in the Table 1 below:

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**Table 1: Small Store Loads**

Ser	Load	Weight Range (kg) <sup>3</sup>	Drop Height (ft)	Wind Speed (knots)	Remarks
(a)	(b)	(c)	(d)	(e)	(f)
1	Harness Pack	30 - 317	250 - 400	25	Can be built onto 'skid boards' if over 150 kg.
2	South East Asia Container	30 - 84	250	25	Developed for easy recovery (2 man lift) during Malayan Campaign.
3	Jungle Line	68 - 113	600	25	Developed for use with high tree canopy.
4	Free Drop	45 - 90	50	No Limit	No parachute required.

13. **Medium Stores.** Stores ranging from 317 to 1000 kg are despatched by a 4-man crew in one ton container loads, through a number of systems depending on the type of aircraft. These are summarised in Table 2.

**Table 2: Medium Store Loads**

Ser	Load	Weight Range (kg)	Drop Height (ft)	Wind Speed (knots)	Remarks
(a)	(b)	(c)	(d)	(e)	(f)
1	Manual Ejection (ME)	317-1134	400	25	Up to 6T despatched in one pass of the DZ in a C130K.
2	Manually Operated Gravity Extraction	317-1134	400	25	Up to 6T despatched in one pass of the DZ in C130K. Can be combined with ME method to despatch up to 24T, but would need an additional pass.
3	Auto Gravity Extraction	317-1134	400	25	Up to 24 T (16T for Mark 1) despatched from C130K. Despatch controlled by pilot.
4	Container delivery System	317-1134	400	25	Up to 24T (Mark 5 aircraft only) despatched in one pass of the DZ from C130J. Despatch operated by pilot.
5	Wedge Airdrop System	754-1588	600	13	Used to despatch with parachutists from the ramp of the aircraft.

<sup>3</sup> Inclusive of weight of parachute.



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14. Large Stores. Heavy stores and equipment such as vehicles, light artillery guns, ammunition, fuel and boats can be despatched from the C130K aircraft. These are summarised in Table 3.

**Table 3: Large Stores Loads**

Ser	Load	Weight Range (kg)	Drop Height (ft)	Wind Speed (knots)	Remarks
(a)	(b)	(c)	(d)	(e)	(f)
1	Medium Stressed Platform	2722-8165	600	15	Up to two platforms can be despatched at any one time and controlled by the pilot. Used in the delivery of vehicles, fuel and ammunition to support ground manoeuvre.
2	PURIBAD	2929-5850 (all up weight)	600	Sea State 5	The Platform Universal Rigid Inflatable Boat Air Drop (PURIBAD) system is used to drop up to two large hulled boats with troops following. Controlled by the pilot.
3	SBAP	680-1134	500	Sea State 5	Up to six Small Boat Air Drop Platform (SBAP) can be dropped with troops following. The boats are semi-inflated.
4	Platform Universal Boat	1000-1460	500	Sea State 5	Up to two small boats can be despatched by an AD crew with troops following.
5	Supply Platform Air Despatch	1360-2270	500	Sea State 5	This is used for the despatch of large quantities of fuel for resupplying boats. Additionally it can be used to deliver combat supplies to troops on the ground. It is despatched using an AD crew.



**Figure 4: PURIBAD Installation and Despatch - Board despatch from a C130K.**

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Figure 5: Container Delivery System and South East Asia Container despatch from a C130J.

## RECENT OPERATIONS

15. Since 2001, the UK's Air Despatch Squadron has been despatching equipment and stores by air in Iraq, Afghanistan and the Falkland Islands. Additionally, a small detachment from the Squadron recently deployed to Pakistan where they were prepared to support the earthquake disaster through delivery of humanitarian aid.



Figure 6: Support to Humanitarian Operation in Ethiopia – Op BUSHEL 1984.

16. The Squadron's greatest commitment over the years has been to the Falkland Islands. While the tasking of AD sorties has greatly reduced in the last 2 years, there has still been a large number of sorties flown in order to delivery supplies to troops on the ground or at sea. It remains an enduring commitment.

17. While the tempo of operations from an AD perspective has fluctuated, the requirement for that capability to be kept at a high state of readiness has meant the deployment of dedicated AD teams throughout the Middle East. Operations in Afghanistan from November 2001 to September 2002 saw 24 sorties of small stores and 74 tons of stores (including fuel drums) despatched from the C130K aircraft. Support to Iraq from Jordan and Cyprus from February 2003 to April 2003 saw a total of 9 sorties of small stores and 49 tons of equipment despatched from the C130K aircraft. From October 2004 to the present day the AD capability remains committed to supporting operations in the Middle East. Recent sorties to Iraq include 7 sorties of small stores, a total of 12 tons of equipment despatch using manual methods and 7 tons of stores despatched from the ramp of the C130J aircraft.



Figure 7: 47 Air Despatch Squadron soldiers on operations in Iraq – Op TELIC 2004.

18. Lessons Identified.

- a. Concepts and Doctrine. Over recent years there has been a lack of understanding in wider Defence on the operational utility of Air Despatch. A Joint Warfare Publication has recently been produced from by the Doctrine and Concept Development Centre in order to help guide commanders and their staff.
- b. Training. Over the years the British Army has proved the utility on operations of owning the full process of delivering stores by air from the receipt of the items to preparing, rigging and loading the stores and finally despatching them from the airframe.
- c. Equipment. Recent operations in Afghanistan have been affected by Above Mean Sea level (AMSL) drop height restrictions on certain loads. It has been necessary to investigate the opening height of the parachute system in order to enable the delivery of large loads on DZs at higher altitudes.
- d. Infrastructure. The Air Despatcher is needed on any recce where AD is being considered as an option in order to identify the key infrastructure requirements for conducting AD operations; specifically rigging areas, shelter for parachute systems, and the host nation support available.
- e. Organisation. The Command and Control organisation for an AD detachment requires consideration at the earliest stages of planning an operation. It is vital that the AD subject matter expert is embedded with the logistic planning teams at the earliest opportunity. Additionally there must be representation in the Tactical Air Lift Command Element.
- f. Personnel. Personnel need to be flexible and should be able to operate on all AD systems when deployed.
- g. Interoperability. There is a need to develop systems in the future that are interoperable with other nationalities airframes and that would also offer utility/availability of equipment that is already in service.
- h. Logistics. Pre-positioning air despatch equipment at the logistic hub is critical in order to meet operational timelines for despatch sorties. Lead in time must be considered at the earliest opportunity.



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### THE FUTURE

19. In looking to the future there are 2 emerging strands, which are likely to influence UK thinking and procurement. These are:

- a. Firstly the need to acquire airdrop systems, which provide greater operational flexibility and thereby allow the User to maximise the payload capability (volume and weight) of the aircraft allocated for an airdrop task.
- b. Secondly the increasing emphasis on precision airdrop (right place, right time).

20. For the last 40 years the UK has employed the Medium Stress Platform (MSP) as the system to be dropped from C130K in order to deliver heavy stores and equipment, primarily for the ABTF. Boats are delivered from C130K using a specialist airdrop system. The MSP is only in-service with the UK and therefore provides no option for interoperability<sup>4</sup> within the context of allied/coalition operations. In addition it has becoming increasingly expensive to support through life. As the C130J is fitted with the Dash 4a Cargo Handling System (CHS) and A400M will enter service with a Dash 4a compatible CHS, the MSP will not be capable of being dropped from these aircraft without modification. However, even if modified the MSP will not enable the User to maximise the payload capability of these aircraft. The UK is therefore looking at other airdrop options. In particular a study has assessed the US Type V platform for use in the C130J and in due course with A400M and work is on-going to baseline the User Requirement Document for a heavy airdrop capability from C130J. In particular the solution must be capable of utilising the payload capacity of C130J and be capable of being dropped worldwide, day or night on drop zones with the probability that the load will land within 250m of the intended impact point.



Figure 8: Light Gun on MSP



Type V Platform

21. The increasing emphasis on precision is driven by some User requirements to be able to insert loads from altitude, probably in concert with parachutists with the certainty that the load will land close to the intended impact point. Delivery of equipment and stores from high altitude provides the option for stand-off delivery which can add a degree of operational security to the intended impact point. Such high altitude delivery can also reduce the threat to the delivery aircraft. Work is on-going in the UK to formalise a Statement of User Requirement to fill this capability gap. However, there has been considerable discussion about whether the key requirement driver is to enable insertion of a forces or their subsequent resupply. UK thinking is probably leaning to the former. While there remains considerable industry activity to develop potential airdrop systems, the UK continues to have some doubts about the technical maturity of the systems on offer. For the UK to consider taking a programme forward we would wish to see solutions available with a Technology Readiness Level<sup>5</sup> of at least 5-6 and in view of the UK

<sup>4</sup> In this context interoperability is referring to the ability to drop a participating nation's load from another nation's aircraft.

<sup>5</sup> TRLs as developed and defined by NASA.

experience with Orion<sup>6</sup> probably level higher. It is expected that the UK will have developed a mature requirement by late 2007.

22. The unpredictable nature of potential future conflicts is likely to require the UK to be able to continue to operate an AD capability worldwide in a variety of conditions. This can include the weather and the topography and for the latter the potential requirement to drop on to high altitude DZs brings additional challenges.

## SUPPORT TO ACQUISITION

23. As part of implementing 'smart acquisition' the UK has developed the CADMID<sup>7</sup> Acquisition Cycle. An important element within the cycle is to continually reduce risk and ensure coherence between the equipment Line of Development and other Lines of Development<sup>8</sup>. The Joint Air Transport Evaluation Unit (JATEU) is an important unit in assessing new airdrop capabilities before they enter service. In summary JATEU supports the following activities:

- a. Installation procedures and rigging schemes.
- b. Despatch procedures and DZ procedures.
- c. Inserts to relevant air publications.

24. JATEU work closely with QinetiQ who provide Development T&E which form recommendations for the Airborne Forces Equip Release Certificate (AFERC), which in turn forms part of the Military Aircraft Release (MAR) – this clears an airdrop system as safe to operate within a given performance envelope. JATEU has an input to the CADMID cycle in several ways:

- a. Concept
  - Specialist advice to User when developing requirements.
  - Specialist advice when selecting options for new systems.
- b. Assessment
  - Specialist advice to assist with the down-select of the best option.
  - Trials work to provide evidence for the selection of options and gathering data to support Investment Appraisals.
- c. Demonstration
  - Carry out airdrop trials and provide recommendations.
- d. Manufacture
  - Provide technical advice to Industry through Procurement Team.
- e. In-service
  - Trials work to verify modifications to systems.

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<sup>6</sup> Orion was designed as high altitude precision airdrop system but due to its unreliability the programme was cancelled.

<sup>7</sup> Phases are: Concept, Assessment, Demonstration, Manufacture, In-service and Disposal.

<sup>8</sup> LODs include: Training, Equipment, Personnel, Infrastructure, Organisation, Concepts and Doctrine, Logistics, Information, Interoperability is an holistic LOD which is considered where appropriate.

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- Developing capability of in-service equipment / systems.
  - Improving / modifying procedures for airdrop.
  - Production and amendment of air publications.
  - Specialist advice to Procurement Teams.
  - Specialist advice to Working Groups.
- f. Disposal
- Technical advice.

## CONCLUSIONS

25. The UK has gained considerable experience of air drop operations since the inception of the capability. The UKs's capability has been driven by the requirements to deliver airborne and Special Forces however, increasing there is recognition that the ability to air drop stores and equipment during asymmetric operations provides operational flexibility when the use of ground manoeuvre units may be a higher risk option. The requirement to operate worldwide along with the need for greater precision (right place and time) is likely to drive the UK towards rationalisation of the current capability.

## SYMPOSIA DISCUSSION – KEYNOTE 1

**Author's Name:** J.A.H. Potter, L.M. Giles

**Discussor's Name:** C. Ciray

**Question:**

What capability do you expect for a precision drop from the A/C?

Precision drop for higher altitudes?

Special containers for equipment to be dropped?

**Author's Response:**

Ability to drop loads at right time and location from low, medium and high level operations may require high probability loads will land within 150m of planned impact point. For high level drop need to consider covertness of loads.

**Discussor's Name:** Luis Ruiz-Calavera

**Question:**

What would be the elements of aircraft design that you would like to see modified to ease your life?

**Author's Response:**

Container Handling System that is consistent across the Air Transport fleet to reduce training burden for Air dispatch soldiers and RAF pilots and Air Load Masters. A system that is simple and flexible.

**Discussor's Name:** T. Jann

**Question:**

What about the time the payload is exposed in the air where it can be attached by the enemy?

**Author's Response:**

There is always a balance between time in the air (which will increase with standoff) and vulnerability of the payload to enemy action (as it may be detected visually or by other means). There is arguably greater risk attached to the airframe travelling at low level to achieve drop accuracy, than with a load being despatched at high altitude/greater standoff. It would be for the Commander to decide what risk he would be prepared to take - the plane or the payload - and it is a risk he would base on the operational requirement.

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